

S Robert Peccia &  
628.72 Associates  
M26scwf Final report for  
1987? the Sand Coulee  
Water System  
Project, Sand  
Coulee, Montana

FINAL REPORT  
FOR THE  
SAND COULEE WATER  
SYSTEM PROJECT  
SAND COULEE, MONTANA  
MONT A/E 86-46-123

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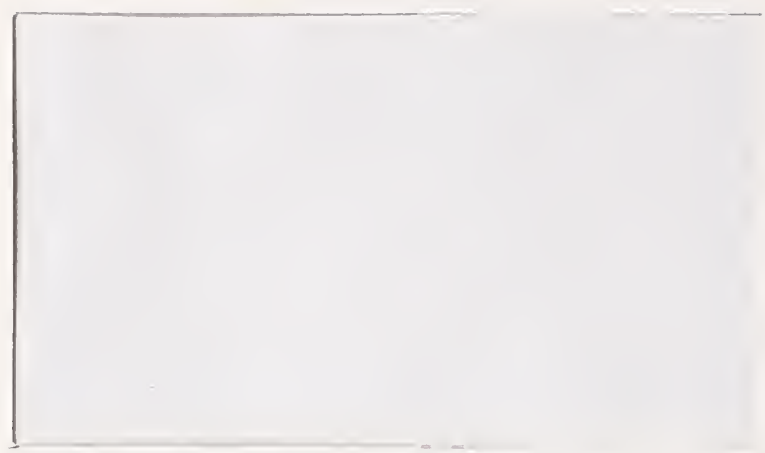
Robert Peccia & Associates

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FINAL REPORT  
FOR THE  
SAND COULEE WATER  
SYSTEM PROJECT  
SAND COULEE, MONTANA  
MONT A/E 86-46-123



## SAND COULEE WATER SYSTEM

### I. INTRODUCTION

The construction phase of the Sand Coulee Water System Project began on April 6, 1987; the substantial completion date for construction was April 30, 1987. The work was performed by Gordon Construction Company of Great Falls under a contract with the Abandoned Mine Reclamation Bureau of the Montana Department of State Lands, Project No. Mont A/E 86-46-123.

Robert Peccia & Associates prepared the engineering plans and specifications to supply water to those households as directed by the Abandoned Mine Reclamation Bureau. Those households receiving a new water supply were chosen by the Department of State Lands (DSL) from a study directed by DSL and executed by the Montana Bureau of Mines and Geology.

The plans and specifications were drawn up pursuant to the objectives established in Montana's Permanent Program Strip and Underground Mine Reclamation Rules and Regulations, specifically ARM 26.4.1235(3). The primary criteria used for preparing the reclamation plans were the protection of human life, health and safety; abatement of adverse social and economic impacts of past coal mining; and the improvement of the use of natural resources.

Robert Peccia & Associates provided quality control inspection services for all of the work executed under Mont A/E 86-46-123.

Attachment No. 1 lists the items covered under the contract schedule, lists the approximate quantities, and shows the pertinent information for the successful bidder and other bidders on the project. The bid price on this project was \$23,527.50; the final project cost was \$26,295.96.

The project included connection of a new water main to the existing Sand Coulee water system; trench excavation and installation of 1,228 lineal feet of six-inch PVC water main and appurtenances; installation of 545 lineal feet of service tubing; installation of four hookups; and necessary landscaping and roadway restoration.

### II. DISCUSSION

Gordon Construction Company of Great Falls, Montana was the lowest bidder for the work outlined in the contract documents with a bid of \$23,527.50. The Agreement for the project was dated February 3, 1987.



The Notice to Proceed for the project was dated February 23, 1987; the initial contract period was for 21 consecutive calendar days. The Contractor requested an immediate winter shutdown.

The Contractor commenced work on April 6, 1987. All of the work, except final landscaping and road surface restoration was completed by April 24, 1987.

The major equipment mobilized to the site were:

1. 580C Case tractor with one-half cubic yard backhoe
2. 950 Cat rubber-tired front-end loader
3. 50 Drott hoe
4. R50 Quomat vibratory trench roller
5. Air compressor
6. Chevrolet dump truck

The Contractor employed one subcontractor to provide the water main trench excavation on the project; Renco, Inc. utilized a Drott 50 track-mounted hoe with a two cubic yard bucket to perform the excavation.

The Sand Coulee Water System Project is located at the southern end of the unincorporated town of Sand Coulee in Cascade County, Montana. The primary purpose of the project was to provide potable water to four households in south Sand Coulee that had previously been identified as using water from contaminated wells. The work completed on this project included installation of a six-inch tapping sleeve and valve to provide a connection to the existing transite water main; trench excavation and placement of 1,228 lineal feet of six-inch Class 150 PVC main; installation of four service connection hookups including 545 lineal feet of one-inch polybutylene service tubing, all related appurtenances and direct plumbing to each of the four residences; installation of eight additional hookups for later use by the Water Users Association; and installation of one three-inch gate valve and one three and one-quarter inch hydrant for blow-off purposes to terminate the new system. The eight additional hookups resulted in an increase of \$2,000.00 to the original contract price and is reflected on Change Order No. 1.

Excavation commenced on April 6, 1987. The existing water main was tapped with a six-inch tapping sleeve and gate valve to avoid interrupting water service to the public. A slight deviation from the original water main location plan necessitated the installation of two 45°



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mechanical joints and one  $11\frac{1}{4}^{\circ}$  mechanical joint to align the trench in a straight line parallel with the roadway. The Contractor was aware of the modification and had all necessary mechanical joints on site. No specification adjustment was allowed since all joints had been purchased previously by DSL on Payment Request No. 1. Trench depth was maintained at a minimum of seven feet.

Trenching, pipe installation and backfill continued with minor problems resulting from rapid infiltration of high ground water into the open trench and intermittent sections of difficult excavation. The Contractor utilized a high output, 40-volt sump pump to dewater the trench. This system worked satisfactorily unless too much trench was allowed to remain open without backfill or if the pump shut down. The high ground water and related saturated condition of the backfill material resulted in an allowance for the Contractor to meet compaction requirements with 85% of maximum density instead of the specified 90% (AASHTO-180). This adjustment was allowed only for the first 600 lineal feet of trench and restricted to the ditch portion of the roadway. Approval of this adjustment was granted by Ken Jorgenson of the Cascade County Road Department. Compaction test results are shown on Attachment No. 2.

Numerous "drain lines" were encountered in the process of trench excavation. The majority of these lines were remnants of earlier, more populous times in Sand Coulee and were obviously long abandoned. Six active or open lines were uncovered, and the Contractor was directed to seal them prior to backfilling the trench. In discussions with Bob Kovack of the Sand Coulee Water Users Association, these lines were not in active use and, therefore, not necessary. Approximate locations of the six capped drain lines are shown on the as-builts.

Water main construction was completed on April 16, 1987, and all 12 service connections installed as specified. An initial hydrostatic pressure test of the system was attempted on Friday, April 17, 1987, but equipment problems developed resulting in a postponement of the test. The Contractor chlorinated the new water main over the weekend and resumed the pressure test on Monday, April 20, 1987. Hydrostatic pressure of  $120 \pm 5$  psi was maintained in the line for a period of two hours. Upon completion of the pressure test, a leakage test was conducted. Leakage was insignificant.

Upon completion of service hookups to the Hovdey, Kukkola, Bridgeford, and Ashmore residences, landscaping was completed in all disturbed areas to the satisfaction of the landowners. Gravel parking areas and shoulders were restored and the asphalt county road was approved and accepted with no repairs necessary. Mr. Ken Jorgenson of the Cascade County Road Department provided final inspection of the roadway.



Water samples submitted to the Cascade County Health Department proved comparable to the quality of water serving the public from the existing water supply system and suitable for domestic use and drinking.

Upon substantial completion of the Sand Coulee Water System Project, the Contractor was requested to perform additional work at several other local DSL project sites. The projects and services rendered included:

1. Furnish and install a three-inch gate valve as directed on the Tracy Water System Project in Tracy, Montana. Cost of additional services was \$495.26.
2. Provide exploratory excavations at the Johnson Wetlands Biological Treatment site. Cost of services was \$37.50.
3. Install drainfield on the Kohlhepp property in Centerville, Montana. The existing Kohlhepp drainfield was allegedly damaged during drilling and construction of the Centerville Community Well. Cost of new drainfield was \$1,025.00.

All work was completed on April 30 and May 1, 1987.

## CONCLUSION

The final contract price for work completed under Mont A/E 86-46-123 was \$26,295.96 including an increase of \$2,768.46 for additional work and change orders. The final pay request is included as Attachment 3.

The Contractor, Gordon Construction of Great Falls, Montana, did an excellent job of overcoming extremely difficult working conditions while maintaining an extremely cooperative attitude with the demands of local residents. The Contractor recognized the intent of the plans but was somewhat indifferent to the conformance of the specifications. Overall, the Contractor achieved acceptable completion of the project through hard work and perseverance.

Attachment No. 4 is an analysis of construction costs for the project compared with the engineering costs. Attachment No. 5 is a copy of the as-built plans for the project.



SAND COULEE WATER SYSTEM  
MONTANA A/E 86-46-123  
Bid Tabulations  
January 8, 1987

Contractor:				Engineer's Estimate		Gordon Construction		Sharbono Construction		Thompson Construction	
Location: License #:				RPA		Great Falls, MT 5068 A		Helena, MT 2353 A		Vaughn, MT 2461 B	
Item No.	Description	Unit	Quantity Required	Unit Price	Bid Price	Unit Price	Bid Price	Unit Price	Bid Price	Unit Price	Bid Price
1.	Type 3 Trench Excavation Type A Backfill	CY	1150	\$5.00	\$5,750.00	\$2.00	\$2,300.00	\$6.75	\$7,762.50	\$11.50	\$13,225.00
2.	6" Class 150 PVC AWWA-rated water main	LF	1275	\$10.00	\$12,750.00	\$11.90	\$15,172.50	\$5.62	\$7,165.50	\$3.00	\$3,825.00
3.	3" Gate Valve	EA	1	\$600.00	\$600.00	\$325.00	\$325.00	\$484.00	\$484.00	\$600.00	\$600.00
4.	3 1/4" Fire Hydrant	EA	1	\$1,500.00	\$1,500.00	\$800.00	\$800.00	\$1,355.00	\$1,355.00	\$700.00	\$700.00
5.	6" Tapping Sleeve and Tapping Valve	EA	1	\$1,500.00	\$1,500.00	\$880.00	\$880.00	\$1,136.00	\$1,136.00	\$1,000.00	\$1,000.00
6.	1" Polybutylene Service Connection Tubing	LF	750	\$7.00	\$5,250.00	\$3.00	\$2,250.00	\$4.75	\$3,562.50	\$1.00	\$750.00
7.	Service Connection Hookup	EA	4	\$300.00	\$1,200.00	\$200.00	\$800.00	\$535.00	\$2,140.00	\$937.50	\$3,750.00
8.	Exploratory Service	HR	10	\$65.00	\$650.00	\$100.00	\$1,000.00	\$55.00	\$550.00	\$60.00	\$600.00
Total Bid (Actual):					\$29,200.00		\$23,527.50		\$24,155.50		\$24,450.00
Total Bid (Contractor):					\$29,200.00		\$23,527.50		\$24,155.50		\$24,450.00



Contractor			Williamson Fencing		GM Construction		Montana Landscape Services		DeBuff Drilling	
Location: License #:			Great Falls, MT 6009 A		Lincoln, MT 4463 A		Great Falls, MT 5074 A		Lewistown, MT 6536 A	
Item No.	Description	Unit	Quantity Required	Unit Price	Bid Price	Unit Price	Bid Price	Unit Price	Bid Price	Unit Price
1.	Type 3 Trench Excavation Type A Backfill	CY	1150	\$9.05	\$10,407.50	\$3.00	\$3,450.00	\$19.00	\$21,850.00	\$15.00
2.	6" Class 150 PVC AWWA-rated water main	LF	1275	\$4.43	\$5,648.25	\$10.50	\$13,387.50	\$3.00	\$3,825.00	\$3.00
3.	3" Gate Valve	EA	1	\$500.00	\$500.00	\$450.00	\$450.00	\$250.00	\$250.00	\$400.00
4.	3 1/4" Fire Hydrant	EA	1	\$990.00	\$990.00	\$800.00	\$800.00	\$575.00	\$575.00	\$1,000.00
5.	6" Tapping Sleeve and Tapping Valve	EA	1	\$1,525.00	\$1,525.00	\$1,000.00	\$1,000.00	\$650.00	\$650.00	\$1,000.00
6.	1" Polybutylene Service Connection Tubing	LF	750	\$4.65	\$3,487.50	\$8.70	\$6,525.00	\$0.75	\$562.50	\$5.00
7.	Service Connection Hookup	EA	4	\$310.00	\$1,240.00	\$250.00	\$1,000.00	\$300.00	\$1,200.00	\$500.00
8.	Exploratory Service	HR	10	\$75.00	\$750.00	\$50.00	\$500.00	\$45.00	\$450.00	\$100.00
Total Bid (Actual):				\$24,548.25	\$27,112.50	\$27,112.50	\$29,362.50	\$30,225.00	\$30,225.00	
Total Bid (Contractor):				\$25,548.25	\$27,112.50	\$27,112.50	\$29,362.50	\$30,225.00	\$30,225.00	



Contractor			Barber Construction		AAA Construction		Lehman Construction	
Location: License #:			Belt, MT 06570 A		Great Falls, MT 5806 A		Great Falls, MT 4850 A	
Item No.	Description	Unit	Quantity Required	Unit Price	Bid Price	Unit Price	Bid Price	Unit Price
1.	Type 3 Trench Excavation Type A Backfill	CY	1150	\$9.00	\$10,350.00	\$5.87	\$6,750.50	\$4.00
2.	6" Class 150 PVC AWWA-rated water main	LF	1275	\$7.44	\$9,486.00	\$16.69	\$21,279.75	\$27.00
3.	3" Gate Valve	EA	1	\$2,000.00	\$2,000.00	\$293.00	\$293.00	\$300.00
4.	3 1/4" Fire Hydrant	EA	1	\$3,000.00	\$3,000.00	\$860.00	\$860.00	\$800.00
5.	6" Tapping Sleeve and Tapping Valve	EA	1	\$2,500.00	\$2,500.00	\$372.00	\$372.00	\$2,000.00
6.	1" Polyethylene Service Connection Tubing	LF	750	\$6.00	\$4,500.00	\$10.24	\$7,680.00	\$10.00
7.	Service Connection Hookup	EA	4	\$500.00	\$2,000.00	\$750.00	\$3,000.00	\$300.00
8.	Exploratory Service	HR	10	\$85.00	\$850.00	\$58.00	\$580.00	\$75.00
Total Bid (Actual):					\$34,686.00	\$40,815.25		
Total Bid (Contractor):					\$34,686.00	\$40,815.25		
						\$51,575.00		
						\$51,575.00		



**Project Name** Sand Coulee Water System  
**and Location:** Sand Coulee, Montana

**Client:** Gordon Construction

**Date Reported:**

**Specifications:**

**Lab No(s):**

**Page No.:**

### COMPACTED SOIL DENSITY SUMMARY

Test No.	Date Tested	Location of Test #	Depth	Description of Soil	Lab M-D Results		Method of Test	Field Test Results				Pass or Fail	
					Max. Dry Density (pcf)	Optimum Moisture (%)		Dry Density (pcf)	Compaction		Moisture		
									% Actual	% Spec.	% Actual		% $\pm$ Optimum
1	4/10/87	Sta. 2 + 21	-2.0'	Silty Clay	120.3	11.7	D 2922	103.0	86	85	18.3		
2	4/10/87	Sta. 4 + 90	-3.0'	"	"	"	"	101.8	85	85	17.9		
3	4/13/87	Sta. 6 + 25	-4.0'	"	"	"	"	108.6	90	90	15.8		
4	4/14/87	Sta. 8 + 80	-4.0'	"	"	"	"	103.3	86	90	17.8		
5	4/15/87	Sta. 8 + 75 (RETEST)	-4.0'	"	"	"	"	113.0	94	90	13.5		
6	4/15/87	Sta. 9 + 50	-3.0'	"	"	"	"	108.9	91	90	17.0		
7	4/15/87	Sta. 11 + 00	-3.0'	"	"	"	"	108.5	90	90	16.1		
8	4/16/87	Sta. 12 + 20	-4.0'	"	"	"	"	106.6	89	90	16.2		
9	4/16/87	Sta. 12 + 26	-4.0'	"	"	"	"	108.0	90	90	16.4		

**Reported to:**

\*Construction Stations

**Submitted by:**

**NOTE:** Test numbers suffixed by a letter indicate a retest of that number.

These tests were conducted in accordance with specified standards. The results are considered representative of the particular sample and location, as reported.



PAYMENT REQUEST NO. 2  
 FROM: April 1, 1987 TO: May 1, 1987

PROJECT NAME: Sand Coulee Water System Project

LOCATION: Cascade County, MT  
 CONTRACTOR: Gordon Construction

PROJECT NO. Mont. A/E 86-46-123  
 ADDRESS: P.O. Box 56  
 Highwood Star Route  
 Great Falls, MT 59405

=====

SUMMARY OF PROJECT STATUS

Amount of Original Contract	\$23,527.50
Amount of Approved Change Order(s)	2,768.46
TOTAL CONTRACT AMOUNT TO DATE (Including Change Orders)	\$26,295.96
Contract Time Used to Date (in days)	26
Percentage of Contract Time Used	100.0%
Percentage of Contract Amount Earned	100.0%
=====	
Total Contract Amount Completed	\$26,295.96
Amount for Materials on Site	0.00
TOTAL to Date	26,295.96
x 90% = TOTAL AMOUNT Earned to Date	N/A
Less Previous Amount Earned	7,308.58
Amount Payable This Period	18,987.38
Less 1% Gross Receipts Tax	189.87
TOTAL DUE CONTRACTOR THIS PERIOD	\$18,797.51

=====

Requested By: Gordon Const.

John W. Gordon Jr.  
 (Contractor)

Date: 5/27/87

Checked By: Robert Peccia & Assoc.

R. Peccia  
 (Engineer)

Date: 6/5/87

Approved By: Dept. of State Lands  
 Abandoned Mine Reclamation Bureau

Richard J. Zuercher  
 (Owner)

Date: 6/5/87



PAY REQUEST NO. 2  
Robert Peccia & Associates

PROJECT: Sand Coulee Water System Improvements Mont. A/E 86-46-123

Page 2 of 2

Item No.	Description	Est. Qty.	Unit Bid Price	Units of Work Completed this Request	Units of Work Completed to Date	Total Cost of Completed Work	% of Est. Qty. Complete
1.	Type 3 Trench Excavation Type A Backfill (Quantity adjusted by C.O. #1, Item 1)	1283 CY	\$2.00	1283	1283	\$2,566.00	100.0%
2.	6" Class 150 PVC AWWA-rated Water Main (Quantity adjusted by C.O. #1, Item 2)	1238 LF	\$11.90	1238	1238	\$14,732.20	100.0%
3.	3" Gate Valve	1 EA	\$325.00	1	1	\$325.00	100.0%
4.	3 1/4" Fire Hydrant	1 EA	\$800.00	1	1	\$800.00	100.0%
5.	6" Tapping Sleeve and Tapping Valve	1 EA	\$880.00	1	1	\$880.00	100.0%
6.	1" Polybutylene Service Connection Tubing (Quantity adjusted by C.O. #1, Item 3)	545 LF	\$3.00	545	545	\$1,635.00	100.0%
7.	Service Connection Hookup	4 EA	\$200.00	4	4	\$800.00	100.0%
	(Quantity and price adjusted by C.O. #1, Item 4)	8 EA	\$250.00	8	8	\$2,000.00	100.0%
8.	Exploratory Excavation	10 HR	\$100.00	7.5	10	\$1,000.00	100.0%
Subtotal:						\$24,738.20	
Change Order Items Not Included Above:							
Change Order 1, Item 5						\$495.26	
Change Order 1, Item 6						\$1,025.00	
Change Order 1, Item 7						\$37.50	
Subtotal Additional Change Order Items:						\$1,557.76	
Previous Amount for Materials on Site:					\$7,870.64		
Amount for Materials on Site this Request:					0.00		
Less amount incorporated in Work:					7870.64		
Subtotal Amount for Materials on Site:					\$0.00		
TOTAL:						\$26,295.96	



# ATTACHMENT 4

ANALYSIS OF CONSULTANT COSTS INCURRED  
 FOR THE MONTANA DEPARTMENT OF STATE LANDS  
 ABANDONED MINE RECLAMATION BUREAU  
 AMR PROJECT NUMBER: MONT. A/E 86-46-123  
 SAND COULEE WATER SYSTEM  
 RPA PROJECT NUMBERS: 8603.15, 8603.16, 8730.11, 8730.12  
 DATE OF PREPARATION: JUNE 11, 1987

ENGINEERING SERVICE	AMOUNT
*****	
DESIGN ENGINEERING:	
1986 CONTRACT	\$8,636.24
1987 CONTRACT	\$985.08
	-----
SUBTOTAL DESIGN ENGINEERING COST:	\$9,621.32
	-----
CONSTRUCTION ENGINEERING AND PROJECT ADMINISTRATION COST:	
1986 CONTRACT	\$847.68
1987 CONTRACT	\$11,171.12
	-----
SUBTOTAL CONSTRUCTION ENGINEERING COST:	\$12,018.80
	-----
PROJECT ENGINEERING COST:	\$21,640.12
	=====

CONSTRUCTION COST:	\$26,295.96
	=====

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TO CALCULATE PERCENTAGE ENGINEERING FEES TO CONSTRUCTION COST:

DESIGN ENGINEERING/CONSTRUCTION COST	36.5886%
CONSTRUCTION ENGINEERING/CONSTRUCTION COST	45.7059%
TOTAL ENGINEERING COST/CONSTRUCTION COST	82.2945%

\*\*\*\*\*

EDIT DATE: JUNE 11, 1987-----AAK



- Existing Wells
- Existing Water Service Connections
- D/L Drain Line
- D/F Drain Field
- T Telephone Line
- New Service Connection

# SAND COULEE WATER SYSTEM PROJECT

Scale 1"=50' North →  
Robert Peccio & Associates

AS-BUILTS

JULY, 1987

